

WHAT IS CLAIMED IS:

1. A stable pharmaceutical formulation comprising:

one or more amino acids which is susceptible to formation of a lactam;

one or more stabilizers to inhibit the formation of said lactam, said stabilizer

comprising a composition that is known to reduce ionic activity; and

at least 20 ppm of an anion.

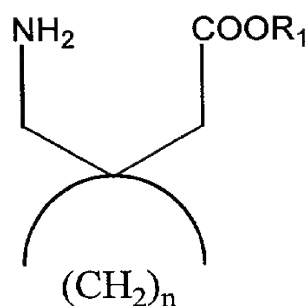
2. The formulation of claim 1 wherein said formulation contains less than 2% by weight of a degradation product of the amino acid after being maintained for 3 months at 40 degrees Centigrade and 75 % relative humidity.

3. The formulation of claim 1 exhibiting a degradation rate of the amino acid no greater than the degradation rate observed in a similar formulation without electronegative ions.

4. The formulation of claim 1 wherein said at least one stabilizer is a volatile alcohol, a non-volatile alcohol, a non-volatile liquid, water miscible liquid or solid, a water immiscible liquid or solid, a liquid surface active agent, a solid surface active agent, an antioxidant, a ketone, or an aldehyde.

5. The formulation of claim 1 wherein at least one stabilizer is a polyethylene glycol of high molecular weight, polyvinylpyrrolidone, or silicon dioxide.

6. The formulation of claim 1 wherein the stabilizer is ethanol, acetone, glycerin, propylene glycol, or polysorbates.
7. The formulation of claim 1 wherein said stabilizer is a liquid with a low dielectric constant.
8. The formulation of claim 8 wherein said stabilizer is a liquid with a dielectric constant below 60.
9. The formulation of claim 8 wherein said stabilizer is a liquid with a dielectric constant below 45.
10. The formulation of claim 8 wherein said stabilizer is a liquid with a dielectric constant below 30.
11. The formulation of claim 1 wherein the amino acid is an amino acid in a crystalline anhydrous form.
12. The formulation of claim 1 wherein the amino acid is a cyclic amino acid.
13. The formulation of claim 12 wherein the cyclic amino acid is a cyclic amino acid of formula:



wherein R_1 is selected from the group consisting of hydrogen and a lower alkyl and n is an integer from about 4 to about 6.

14. The formulation of claim 13 wherein the cyclic amino acid is gabapentin.

15. The formulation of claim 1 further comprising one or more adjuvants.

16. The formulation of claim 15 wherein the adjuvant is a pharmaceutically acceptable excipient.

17. The formulation of claim 15 wherein the adjuvant is a modified cellulose, a microcrystalline cellulose, a starch, a sodium starch glycolate, talc, or stearates.

18. The formulation of claim 17 wherein the adjuvant is corn starch.

19. The formulation of claim 15 wherein the adjuvant retards degradation of the amino acid.

20. The formulation of claim 1 wherein the pharmaceutical formulation is formed as a tablet, a coated tablet, a caplet, a bead, a capsule, or a hard shell gelatin capsule, or a hard shell

HPMC capsule.

21. A formulation comprising:

at least one amino acid which is susceptible to formation of a lactam;

one or more stabilizers to inhibit the formation of said lactam, the stabilizer

being one which is known to reduce ionic activity; and

at least 20 ppm of an anion from a mineral acid.

22. The formulation of claim 21 wherein said formulation contains less than 2% by weight of a degradation product of the amino acid after being maintained for 3 months at 40 degrees Centigrade and 75 % relative humidity.

23. The formulation of claim 21 exhibiting a degradation rate of the amino acid no greater than the degradation rate observed in a similar formulation without electronegative ions.

24. The formulation of claim 21 wherein said at least one stabilizer is a volatile alcohol, a non-volatile alcohol, a non-volatile liquid, water miscible liquid or solid, a water immiscible liquid or solid, a liquid surface active agent, a solid surface active agent, an antioxidant, a ketone, or an aldehyde.

25. The formulation of claim 21 wherein at least one stabilizer is a solid polyethylene glycol of high molecular weight, polyvinylpyrrolidone, silicon dioxide, or a combination thereof.

26. The formulation of claim 21 wherein the stabilizer is ethanol, acetone, glycerin, propylene glycol, or polysorbates.

27. The formulation of claim 21 wherein said stabilizer is a liquid with a low dielectric constant.

28. The formulation of claim 27 wherein said stabilizer is a liquid with a dielectric constant below 60.

29. The formulation of claim 27 wherein said stabilizer is a liquid with a dielectric constant below 45.

30. The formulation of claim 27 wherein said stabilizer is a liquid with a dielectric constant below 30.

31. The formulation of claim 21 wherein the amino acid is gabapentin in its crystalline, anhydrous form.

32. The formulation of claim 21 wherein the mineral acid is hydrochloric acid.

33. The formulation of claim 21 wherein the mineral acid is hydrochloric acid and the amino acid is gabapentin.

34. The formulation of claim 21 wherein the anion is Cl^- obtained from hydrochloric acid.

35. The formulation of claim 21 wherein the lactam is present in an amount less than about 0.8% by weight of the active ingredient.

36. The formulation of claim 21 wherein the lactam is present in an amount less than about 0.4% by weight of the active ingredient.

37. The formulation of claim 21 wherein the lactam is present in an amount less than about 0.25% by weight of the active ingredient.

38. The formulation of claim 21 wherein the lactam is present in an amount less than about 0.15% by weight of the active ingredient.

39. The formulation of claim 21 further comprising one or more adjuvants.

40. The formulation of claim 39 wherein the adjuvant is a pharmaceutically acceptable excipient.

41. The formulation of claim 39 wherein the adjuvant is a modified cellulose, a microcrystalline cellulose, a starch, a sodium starch glycolate, talc, or stearates.

42. The formulation of claim 41 wherein the adjuvant is corn starch.

43. The formulation of claim 39 wherein the adjuvant retards degradation of the amino acid.

44. The formulation of claim 21 wherein the pharmaceutical formulation is formed as a tablet, a coated tablet, a bead, a hard shell gelatin capsule, or a hard shell HPMC capsule.

45. A process for forming a stable pharmaceutical formulation containing at least 20 ppm of an anion, comprising the steps of treating an amino acid susceptible to formation of a lactam with a stabilizer to inhibit the formation of said lactam.

46. The process of claim 45 wherein the stabilizer is a volatile alcohol, a non-volatile alcohol, a non-volatile liquid, water miscible liquid or solid, a water immiscible liquid or solid, a liquid surface active agent, a solid surface active agent, an antioxidant, a ketone, or an aldehyde.

47. The process of claim 45 wherein the stabilizer is a solid polyethylene glycol of high molecular weight, polyvinylpyrrolidone, silicon dioxide, or a combination thereof.

48. The process of claim 45 further comprising the step of reacting the amino acid with a mineral acid.

49. The process of claim 45 further comprising the step of washing the amino acid to remove at least a portion of the mineral acid.

50. The process of claim 48 wherein the amino acid is treated with the stabilizer during purification of the amino acid to form a purified amino acid.

51. The process of claim 48 wherein the amino acid is treated with the stabilizer during granulation of the amino acid.

52. The process of claim 45 wherein the amino acid is treated with a first stabilizer during purification to form a purified amino acid and the purified amino acid is treated with a second stabilizer during granulation of the purified amino acid.

53. A stable pharmaceutical formulation comprising:

one or more active agents that are susceptible to degradation caused by electronegative ions;

one or more stabilizers to inhibit the degradation; and

at least 20 ppm of an anion.

54. The formulation of claim 53 wherein said formulation contains less than 2% by weight of a degradation product of the amino acid after being maintained for 3 months at 40 degrees Centigrade and 75 % relative humidity.

55. The formulation of claim 53 exhibiting a degradation rate of the amino acid no greater than the degradation rate observed in a similar formulation without electronegative ions.

56. The formulation of claim 53 wherein the active agent is an amino acid.

57. The formulation of claim 53 wherein the active agent is susceptible to degradation caused by a process selected from the group consisting of formation of a lactam, or dehydration and cyclization.

58. The formulation of claim 53 wherein the stabilizer is a volatile alcohol, a non-volatile alcohol, a non-volatile liquid, water miscible liquid or solid, a water immiscible liquid or solid, a liquid surface active agent, a solid surface active agent, an antioxidant, a ketone, or an aldehyde.

59. The formulation of claim 53 wherein the stabilizer is a solid polyethylene glycol of high molecular weight, polyvinylpyrrolidone, silicon dioxide, or a combination thereof.

60. The formulation of claim 53 wherein the stabilizer is ethanol, acetone, glycerin, propylene glycol, or polysorbates.

61. The formulation of claim 53 wherein the active agent is an amino acid in a crystalline anhydrous form.

62. The formulation of claim 53 wherein the active agent is gabapentin.

63. The formulation of claim 58 wherein the active agent is anhydrous gabapentin.

64. The pharmaceutical unit dosage form of an amino acid susceptible to lactam formation comprising:

the amino acid;

at least 20 ppm of anionic species; and

at least one stabilizer for inhibiting formation of the lactam, the dosage form exhibiting improved stability as compared to a similar formulation with less than 20 ppm anionic species.

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